

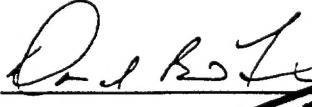
NAVAL WAR COLLEGE  
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Plugging the Navy into Theater Missile Defense

by  
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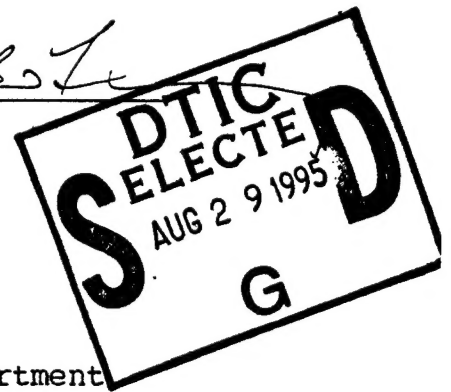
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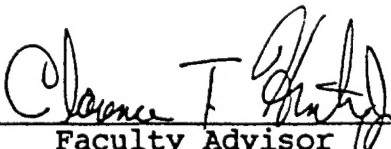
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## ABSTRACT

Theater Missile Defense (TMD) has several doctrinal and organizational issues which are not yet resolved, although progress is being made. The Navy is obliged to develop its capabilities to integrate with the other joint TMD forces.

Joint Pub 3-01.5, Doctrine for Joint Theater Missile Defense (TMD) does not specifically prescribe a TMD organization, nor does it address where the director of TMD operations should be located in the organization.

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Theater expertise can be provided by a dedicated joint TMD Cell which is also deployable to augment a JTF staff. Other trained personnel should be infused into key organizational nodes. Integral to TMD Cell effectiveness is connectivity with the Joint Tactical Ground Station (JTAGS), the source of missile warning and trajectory data.

The Navy Combined Warfare Command structure is not compatible with other joint organizations, and requires modification. New command and control systems allow afloat commanders virtually limitless capabilities in managing TMD. Cooperative Engagement Capability (CEC) has already shown tremendous potential for linking afloat and ashore TMD missile systems.

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## Preface

Theater Missile Defense (TMD) is an evolving warfare mission far from doctrinal resolution. This paper deals with operational level TMD architecture and the Navy's role in the organization. Discussion draws heavily from three developmental publications which are not yet endorsed by the Chief of Naval Operations or the Joint Chiefs of Staff, but are excellent sources of potential doctrine and reorganization.

According to Joint Pub 3-01.5, the joint term "theater missile (TM)" applies to ballistic missiles, cruise missiles and air-to-surface missiles. The Navy often specifies Theater Ballistic Missile Defense (TBMD) to distinguish ballistic missile defense from that for cruise and air-to-surface missiles, for which defensive procedures and tactics which have been established. In this paper TMD means TBMD and discussion will center only on ballistic missile defense.

Much of the information dealing with recent TMD operations was derived from personal experience while serving on the U.S. Navy Sixth Fleet Staff. Therefore, the proposals in this paper are slanted to the political/military situation in Europe.

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## Plugging the Navy into Joint Theater Missile Defense

What is needed is a robust, synergistic, interoperable, seamless force multiplier to apply asymmetrical leverage for achievement of strategic goals across all warfare spectra without paradigm shift.

Anonymous cliché obsessed joint staff officer

### Introduction

The Navy has developed capabilities, tactics and organizations to suit its service-unique missions, formerly without consideration for integration with the Army and Air Force. Warfare will be increasingly joint and complex, and preparation now is vital for future success. A new form of warfare emerging in the 1990s is Theater Missile Defense, the importance of which has gained worldwide recognition.

The Navy already can participate in TMD by providing extended range detection via C3 systems to other defensive units, and is developing a counter TBM version of the Standard Missile, but must be truly integrated into the theater and with the other services. This is in the best interest of American and allied defense efforts. The following operational questions involved in "plugging" the Navy into Joint Theater Missile Defense (JTMD), with particular emphasis on "Joint" and "Theater", require investigation and resolution before the services can solve the TMD problem.

1. What is the joint TMD organization?
2. Where should the TMD "Director" be located in the organization? Should it be a Warfare Commander or Coordinator?
3. Who should be responsible for overall execution of TMD?
4. How can the Navy adapt to fit this organization?
5. How can the Navy contribute to command and control of TMD?

These issues will likely not all be resolved in this paper, but their discussion will show the challenge of this new warfare form.

## Background

TMD must be joint and adaptable for multi-national warfare. It must integrate with the CINC and National Command Authority structure, with theater offensive operations, with theater air defense operations, and to the extent possible with C3I of allies or coalition partners.<sup>1</sup>

TMD comprises four operational elements: passive defense; active defense; attack operations; and Battle Management Command, Control, Communications, Computers and Intelligence (BMC4I). Passive defense operations reduce vulnerability and minimize the effects of damage caused by TBM attack. Passive

defense includes early warning, Nuclear, Biological, and Chemical (NBC) protection, deception, camouflage and concealment, hardening, mobility, and dispersal. Active defense operations protect against attack by destroying TBMs in flight. It includes multi-tiered defense in depth for multiple engagements. Attack operations by air, land and sea forces destroy or neutralize TBM launch platforms and their supporting C3 and logistic structures. BMC4I is integrated doctrine, procedures, organizational structure, facilities, communications, computers and intelligence that support the other operational elements. It includes missile warning and cueing of defense systems by missile warning sensors and ground stations. C4I provides data and systems to plan, monitor and control TMD operations.<sup>2</sup>

For active defense, the Army is improving the lower tier Patriot PAC-3 missile which optimizes the missile and warhead for TBM targets. The Army long range upper tier defense system will be the Theater High Altitude Area Defense (THAAD) missile with its associated ground-based radar.

The Navy's lower tier effort is a Block IVA version of the SM-2 Standard missile and modifications to the software of the Aegis SPY-1 radar system to allow tracking and engagement of TBMs. The Navy's upper tier will mate the SM-2 with a homing kill vehicle to destroy TMs at altitudes in the hundreds of kilometers. The Navy may pursue a ship-based version of THAAD.<sup>3</sup>



The Marine Corps is modifying the Hawk missile system to provide a limited lower tier TBM capability.

Defense Support Program (DSP) satellites operate in geosynchronous orbit to provide 24-hour surveillance. DSP data processors forward launch detection and missile parameter information to the U.S. Space Command as part of the Tactical Event System (TES), or directly to theater Joint Tactical Ground Stations (JTAGS).<sup>4</sup>

Once a launch is observed, launch warning, impact point/time predictions, and missile type are passed by JTAGS to military units and civil authorities, triggering passive defense actions. TBM trajectory data is made available in near-real-time to C4I centers and forces supporting active defense and attack operations<sup>5</sup> via two communications networks: the Air Force Tactical Information Broadcast Service (TIBS) and the Navy Tactical Data Distribution System (TDDS) (formerly known as Tactical Related Equipment and Related Applications (TRAP)) over satellite channels. Units not equipped with TIBS or TDDS require voice connectivity.<sup>6</sup>

## Issues

### 1. What is the joint TMD organization?

Sage military philosophy apropos to TMD is: the perfect doctrine used in conjunction with the most technologically advanced systems will not guarantee victory without solid organizational structure to provide the necessary leadership and guidance. The only way to maintain an agile air defense network is to ensure the systems can interact with each other and that a single organization makes the decisions to employ the defensive systems.<sup>7</sup>

Curiously, there is no prescribed joint TMD organization to be used as a framework for the Joint Force Commander (JFC). Joint Pub 3-01.5, Doctrine for Joint Theater Defense does not address this issue specifically. This may be intentional in order to allow flexibility in the organization. In the final analysis, it will be the JFC or CINC who determines the mix and deployment of TMD systems most appropriate to the threat, the area of operations and the phase of the operation.<sup>8</sup> The broad scope of TMD does not lend itself easily to classic wiring diagrams because it spans more than one warfare area. It is an offensive and defensive multi-service mission. The TMD organization must be structured to support the mission, not vice versa. It can be argued that there have been attempts to shoehorn TMD into existing organizations in the past.

Essential to resolution of the TMD architecture is a discussion of its relationship with Theater Air Defense (TAD). If TMD is to be considered separate from TAD, perhaps it deserves a separate organization. There are two schools of thought concerning the nature of TMD:

1. TMD is a separate and distinct mission area with its own target set and unique command and control relationships; or
2. TMD is a subset of TAD, and should be integrated into an existing air defense structure.

Both models may be valid depending on the situation. Active defenses are integrated into the BMC4I system which supports TAD. Some TMD weapons are capable of engaging manned aircraft, cruise missiles, and ballistic missiles. Depending on the situation, it is probable that some active defense TMD systems would be called upon to function in an air defense role. The degree to which TMD active defense and air defense operations are related is a function of the threat. In those instances where the threat is predominantly from ballistic missiles, it is possible to consider TMD active defense and air defense as separate entities. However, when there is a significant fixed-wing and TM threat, it is necessary to consider active defense TMD and TAD as closely related.<sup>9</sup> Some lower tier weapons may have capability against all types of airborne targets, but upper tier missiles will probably not be as versatile and would be dedicated strictly to TMD. Those upper tier assets could be considered separate from air defense

and could provide logic for a separate strictly TMD organization. However in the interest of simplicity, one organization should be made to suffice for both missions.

Navy Doctrine Command states that TMD is a subset of air defense.<sup>10</sup> The Air Force advocates the same philosophy, while the Army considers them to be separate issues.<sup>11</sup> Resolution by the Joint staff may dictate this majority view and obviate the need for a unique TMD organization.

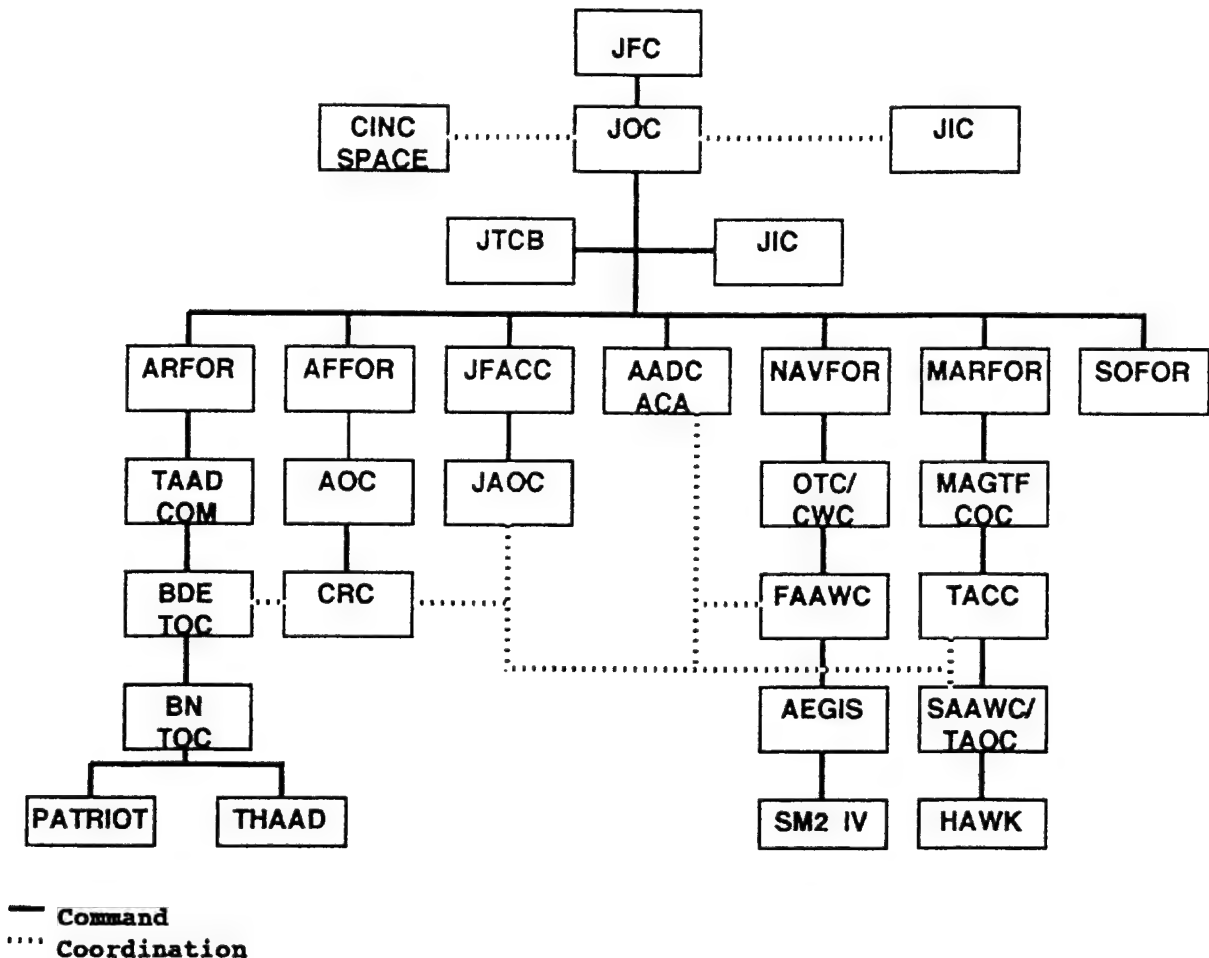


Figure 1. Joint AD/TMD Organization

Figure 1 is an Air Defense/TMD organization which could be used in joint TMD, although it is not found in Joint Pub 3-01.5.<sup>12</sup> It includes all entities involved in active defense, but neglects aircraft, Army Tactical Missile System (ATACMS), Tomahawk missiles, or Special Operations forces used for attack operations. After modification by adding those assets under tactical control of the JFACC and prescribing coordination between the different services, the organization is adequate for passive and active defense, and attack operations.

2. Where should the TMD "Director" be located in the organization? Should it be a Warfare Commander or Coordinator?

Also absent from Joint Pub 3-01.5 is the specific location of the overall TMD Director in the organization. There are at least two commanders with important TMD functions, the Area Air Defense Commander (AADC) and the Joint Force Air Component Commander (JFACC). The AADC is responsible for dissemination of launch warning and cue information to components and active defense forces; and executing TMD active defense operations.<sup>13</sup> The JFACC is responsible for offensive air operations, including TMD attack operations. If the JFC establishes a JFACC, the JFC may also assign responsibilities of the AADC to the JFACC.<sup>14</sup> This arrangement has the advantage of control of all airspace, aircraft and air defense missile systems by a

single entity, the JFACC/AADC, which should help to preclude active defense forces engaging attack operations aircraft.

When the Navy enters the TMD fight, organizational complexity becomes more apparent and requires higher level oversight. The Navy's Combined Warfare Commander (CWC) concept which serves as the "keel" of Battle Group operations is shown in Figure 2<sup>15</sup> and bears almost no resemblance to the organization in Figure 1. In the CWC organization, the Antiair Warfare Commander (AAWC) implements passive defense measures, establishes airspace control procedures, and conducts active defense. The Strike Warfare Commander (STWC) conducts the attack operations of TMD.<sup>16</sup> This difficulty in integrating the fleet into a joint organization illustrates the need for a TMD Director.

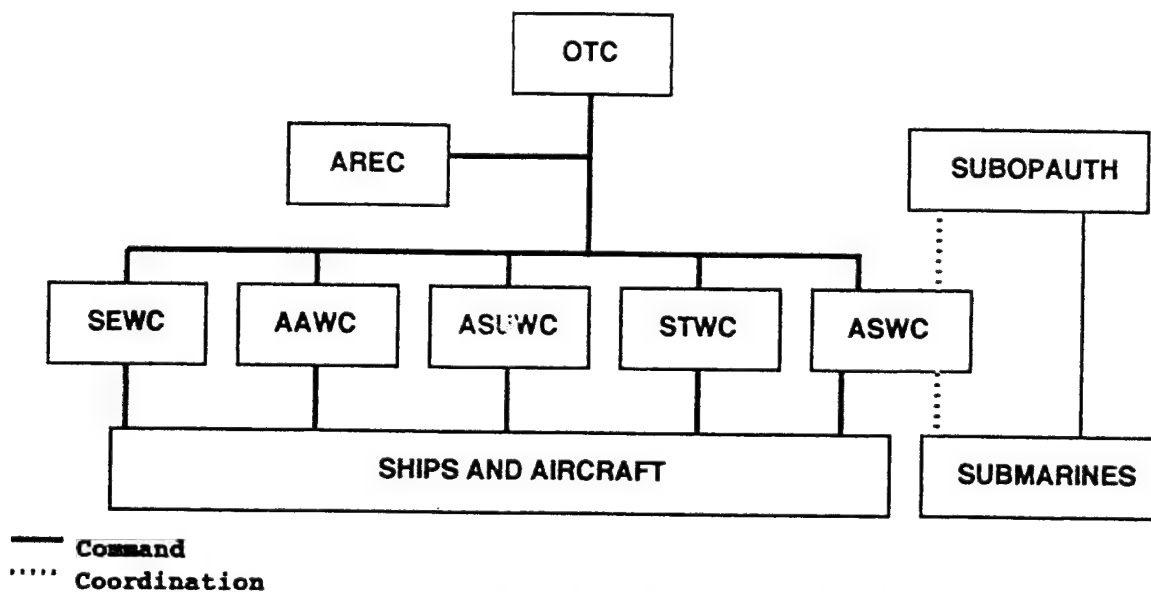


Figure 2. Combined Warfare Commander Structure

The joint organization is more manageable when only Army and Air Force units are involved, and JFACC/AADC control of TMD is fairly straightforward. Personal experience in joint European exercises has shown that the Air Force prefers the JFACC/AADC to execute TMD. Such an arrangement can work. However, there are coordination problems which can lead to conflicting tasking within the Joint Task Force (JTF) without strong guidance from the Commander, especially when Navy TMD forces are involved. Key to this argument is that Navy ships are multi-mission and not manageable in the same manner as single-purpose air defense units or attack aircraft. The JFACC/AADC does not have cognizance over all missions for which multi-function Aegis ships are tasked in fleet defense missions by the Officer in Tactical Command (OTC) (Navy organization)/ Maritime Component Commander (MCC) (joint organization). Aegis ships may be required to execute Tomahawk strikes from positions incompatible with the JFACC/AADC requirements, or perform anti-submarine warfare which would preclude remaining near-stationary while protecting littoral centers of gravity. Because ships can be responsible to more than one warfare commander, coordination at a higher level than JFACC/AADC is necessary, ideally at the Joint Operations Center (JOC), or on the JTF staff. Until we have the luxury of several Aegis capable ships in a Battle Group which can be individually tasked by separate warfare commanders, high level coordination is required. The Joint Target Coordination Board (JTCB) needs TMD expertise for resolution of priorities in TMD attack operations. Also, because of the

political importance of TMD, as was patently demonstrated in the Gulf War, such issues should be resolved at a level superior to the JFACC/AADC.

The TMD director should be placed at a high level within the command structure, usually above the JFACC level. However, as with the overall organizational structure, the JFC has the final authority to decide from whence TMD is directed. Despite broad organizational influence, the TMD Director does not directly own any forces, and must be considered a Coordinator rather than a warfare Commander.

3. Who within the organization should be responsible for overall execution of TMD?

Because of its disparate nature, TMD expertise must be part of every key unit. Trained TMD specialists, most notably the TMD Coordinator must directly advise the JFC and operate with all Components for optimum integration. This does not require a new organization but an infusion of joint experts throughout the entire TMD structure. Some CINCs have a TMD planning or coordination cell within their staffs. Their purpose is to ensure coordination in all facets of planning, and execution of TMD. Coalition representatives should be included to provide operational expertise and advice on host nation C2.<sup>17</sup> Such is the case in the European Theater.



The United States European Command (USEUCOM) concept centralizes operations/intelligence functions in a "TMD Cell" which facilitates passive defense, active defense and attack operations. The cell is primarily composed of Component systems operators assembled around a core of USEUCOM staff representatives, assisted as needed by Component operations and intelligence representatives. When activated and deployed, this cell augments the JTF to facilitate JTMD operations. Positioning of the TMD cell is dependent on the conflict environment, available communications infrastructure, available space, and mission focus. Its location is determined by the JFC and there is no intent to habitually associate the TMD Cell with any particular Component. Training and exercises focus on augmenting any Component, with linkages to all Components' key systems and functions.

The cell provides voice warning and message warning of missile launch over TDDS and TIBS; near-real-time target data on missile launcher location; possible egress route prediction; hide sites and supporting infrastructure for attack operations.<sup>18</sup>

An important component of the EUCOM TMD Cell is the theater's primary TM launch detection system, the Joint Tactical Ground Station (JTAGS). This joint Army/Navy system provides direct downlink from DSP satellite sensors for coverage of the

EUCOM and Central Command theaters (another exists in Korea). It has proven to be the most rapid means of missile launch and warning dissemination.<sup>19</sup> When the JTAGS system senses a launch, it automatically creates missile warning and track messages. It generates and disseminates warning, alerting and cuing information on TBMs via TIBS, TDDS and the Joint Tactical Information Distribution system (JTIDS), and provides information on launch points, predicted impact points and TBM profiles.<sup>20</sup>

The TMD Cell's core of experts should be tasked with directing all TMD operations, whether ashore or afloat. Connectivity with JTAGS is essential to missile effectiveness, and must be maintained. A parallel national system known as Alert Launch Early Reporting to Theater (ALERT) can provide similarly usable system to the TMD Cell.

#### 4. How can the Navy adapt to fit the TMD organization?

Navy-specific missions do not correspond easily to joint organizations, especially those dealing with fleet defense. This is frustrating for all the services. Naval Doctrine Command investigated alternatives to the classic CWC concept to align it more closely to joint organizations.<sup>21</sup> The resulting proposed structure is shown in Figure 3.

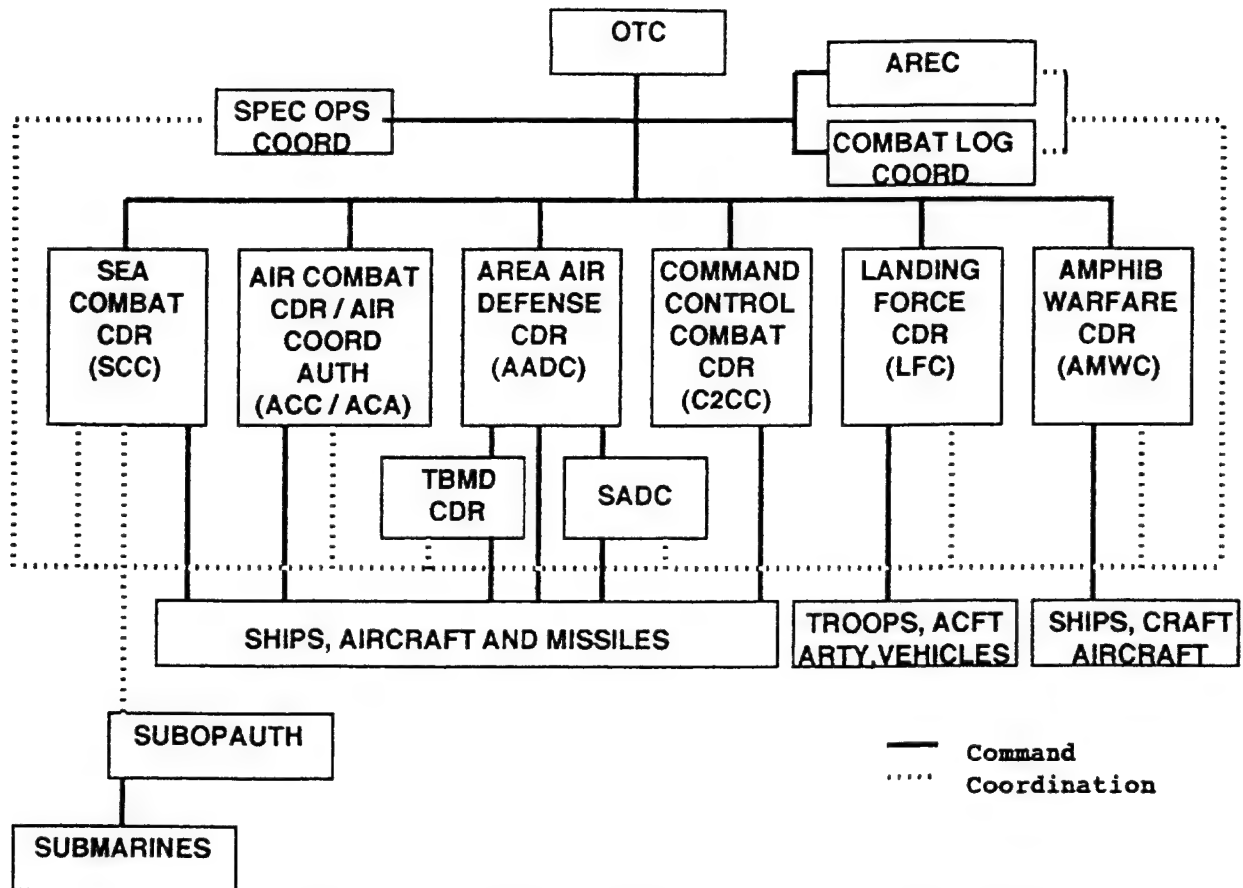


Figure 3. Integrated Battle Group C2 Concept

This can facilitate lashing Navy assets within the proposed organization with joint forces. It combines the former STWC mission with airspace control under the Air Combat Commander (ACC)/Airspace Coordination Authority (ACA), somewhat akin to function of a JFACC/ACA. The AAWC becomes the Area Air Defense Commander (AADC). The TMD Commander (more arguably a coordinator) reports to the AADC and coordinates with all warfare commanders.<sup>22</sup> Because of discussion presented earlier, the TBMD Coordinator should occupy a more senior position. Although the issue is far from resolved, it is a step in the right direction.

5. How can the Navy contribute to JTMD command and Control?

The Navy can rapidly deploy TMD assets to crisis areas without regard to basing rights, overflight permission, or complicated deployment schemes.<sup>23</sup> While sea-based systems have potential to provide autonomous TMD protection, they will also operate effectively when connected to sensor and weapon defense assets of the other services<sup>24</sup>. Current Navy C3I systems link ships, aircraft, and shore assets with a comprehensive view of the battlespace.<sup>25</sup> Connectivity between Navy and Army, Air Force and allied C3 systems has been demonstrated.

It is highly desirable that sensors/weapon systems be netted to allow targets detected by one sensor to be passed to a second weapon system for engagement. The Navy's Cooperative Engagement Capability (CEC) is an example of a netted architecture which can pass radar data and help resolve identification ambiguities.<sup>26</sup> Although it is not a joint system, CEC could revolutionize joint warfare. It allows Aegis, other ships and surveillance aircraft, to fuse fire control quality target data with much greater accuracy than any single sensor can. By using the composite track generated by ships or aircraft at other locations whose sensors have detected the target, a ship will be able to engage an attacking missile even if its own sensors haven't acquired the missile. Each ship or aircraft in the area of operations views identical target tracks, providing a uniform air picture. Cooperative engagement

will provide quicker reaction times and longer intercept ranges.<sup>27</sup> These advantages apply to Patriot as well, and CEC connectivity has been accomplished between Aegis and Patriot, although it requires all participants to be equipped with CEC equipment, and CEC is not yet a theater option. Also, CEC is not compatible with Link 16, the joint link system. However, given its unmatched data exchange capability, CEC may well be adopted by all the services eventually. Our allies also have great interest in CEC, especially those equipped with Patriot.

With improvements in Navy flagship, aircraft carrier and cruiser BMC4I systems, connectivity is possible with virtually any shore-based entity. A new system which has been developed by the Army and Navy shows great promise for JTMD command and control, especially for a JFC afloat. This mobile suite of systems, colloquially referred to as "TMD-in-a-Box", which has been acquired by the EUCOM TMD Cell, primarily supports Army C3I functions but has several TMD applications. It supports exercises, and shows potential for use in contingency operations. This suite includes connectivity to theater intelligence and operations systems<sup>28</sup> and can be deployed aboard ship.

Information which can be exchanged between "TMD-in-a-Box" and the Navy includes friendly and hostile air, surface and ground tracks; JTAGS-provided TBM data; Army force disposition; ship positions; Airspace Control Zones; weather data; and

graphic displays of area radar coverage and missile engagement zones.<sup>29</sup> TMD-in-a-Box can receive TBM data from JTAGS combined with meteorological data to develop an NBC contamination footprint available to system subscribers.<sup>30</sup>

A subsystem of TMD-in-a-Box is Extended Air Defense Simulation (EADSIM), a theater-level simulation capability which supports analysis<sup>31</sup> of the placement of Patriot, Hawk and Aegis to optimize TBM surveillance and track coverage.<sup>32</sup> TMD-in-a-Box also accesses the theater's primary JTMD targeting tool, Generic Area Limitation Environment (GALE). Taking launch area information from JTAGS, this system can refine launch points within 500 meters in less than 60 seconds. Its data storage and analysis functions assist in determining launcher possible egress routes, hide sites and infrastructure targets.<sup>33</sup> This system can greatly assist in TMD attack operations.

Improved intelligence paths such as GENSER Joint Deployable Intelligence Support System (JDISS) allows TMD targeting information to almost any unit in the Battle Group. Because of all these new systems, there is virtually no limit to what can be accomplished by afloat Naval forces.

### Summary

1. The TMD organization from Figure 1 could be revised to that in Figure 4 by adding units involved in attack operations,

and the additional lines of control and coordination. The TMD Coordinator is depicted as having several possible location options in the organization. Shaded boxes in the diagram indicate where TMD experts should be integrated into existing organizational units.

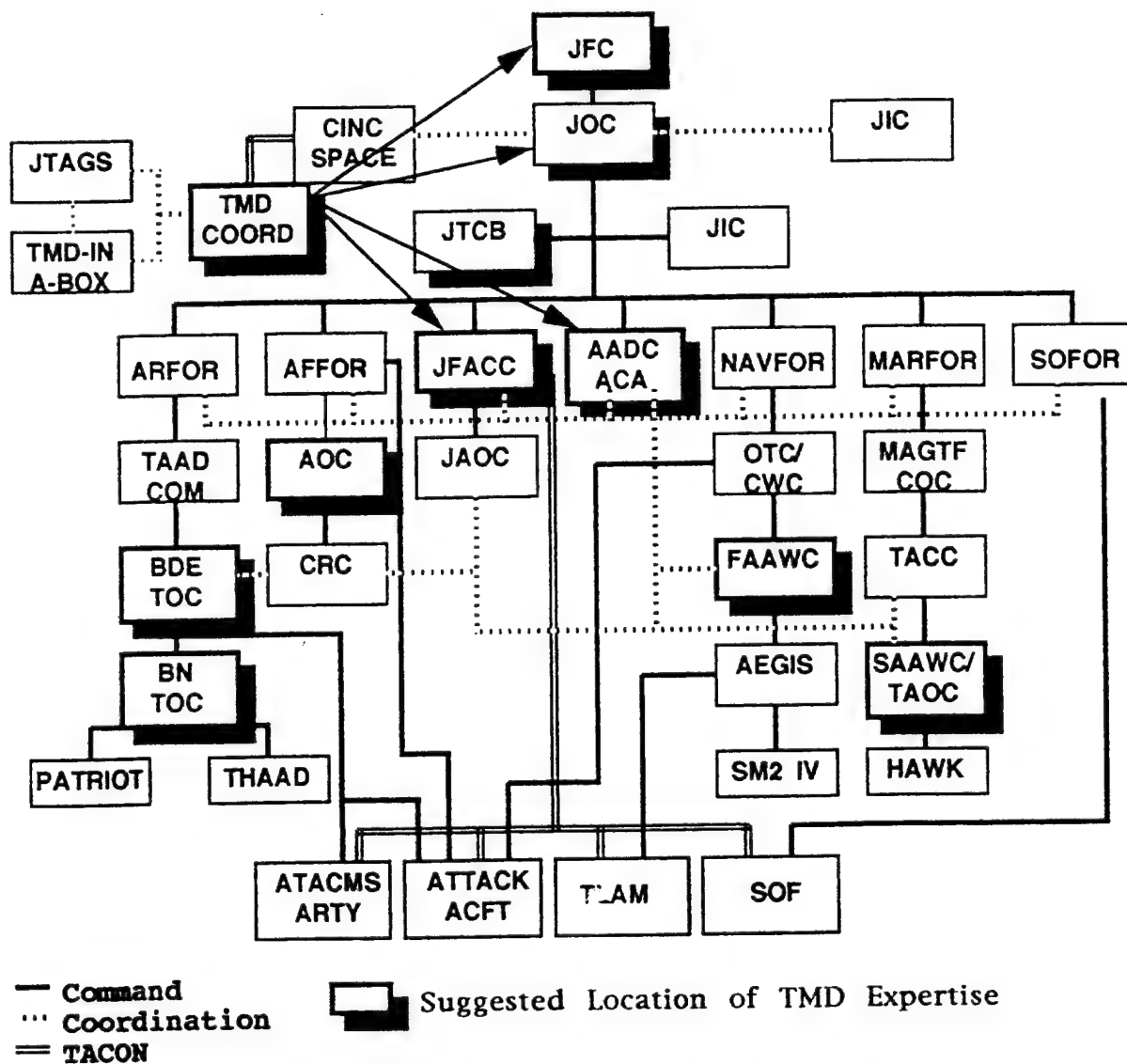


Figure 4. Modified Joint AD/TMD Organization

2. Overall TMD direction should be performed at a high level, sometimes by the JFACC/AADC, but usually at the JOC or JTF level. The person responsible for TMD operations is a Coordinator, not a Commander, and Figure 4 shows the possible placement within existing warfare functions.

3. A highly trained core of joint personnel who are schooled in TMD operations should be responsible for TMD operations. The bulk of that cell belongs with the TMD Coordinator, and other Cell-trained personnel should be infused throughout critical nodes in the organization.

4. The Navy should continue to resolve organizational issues to make it more compatible with joint architectures.

5. The Navy is fully capable to conduct and coordinate TMD operations afloat. Improved connectivity and advanced weapons systems allow forces at sea to effectively integrate with others ashore. Joint application of developmental systems is essential to success in all future operations.



## Notes

<sup>1</sup>Ballistic Missile Defense Organization, Department of Defense, 1993 Report to Congress on the Theater Missile Defense Initiative (TMDI) (Washington DC: 1993), p. EX-5.

<sup>2</sup>Naval Doctrine Command. Draft Navy Concept Paper for Theater Ballistic Missile Defense Concept of Operations, (Norfolk VA: 1 March 1995), pp. 7-8.

<sup>3</sup>Glenn W. Goodman, Jr., "Unfurling a Leakproof Umbrella. Navy Theater Missile Defense's Time Has Come." Armed Forces Journal, April 1995. pp.22-23.

<sup>4</sup>The Joint Staff, J-36 Joint Theater Missile Defense CONOPS. (Washington DC:17 February 1995), p.30. This document has been submitted to JCS J-7 for approval. When approved, it will become a Joint Tactics, Techniques and Procedures Document. Joint Pub 3-01.5 may be superseded by the JTTP.

<sup>5</sup>Joint Chiefs of Staff. Doctrine for Joint Theater Missile Defense Joint Pub 3-01.5. (Washington DC: 30 March 1994), pp. III-4,19.

<sup>6</sup>The Joint Staff, p.35.

<sup>7</sup>Cornell T. McGhee, "Elevating the Shield of Blows: Theater Missile Defense for the Twenty-first Century." Unpublished Research Paper, United States Army Command and General Staff College, School of Advanced Military Studies, Fort Leavenworth KS: 15 May 1993, pp.37-38.

<sup>8</sup>Louis C.Wagner, Jr., "Theater Missile Defense." Army, November 1994. p.27.

<sup>9</sup>The Joint Staff, pp.5,13.

<sup>10</sup>Naval Doctrine Command. Draft Navy Concept Paper for Theater Ballistic Missile Defense, p.1.

<sup>11</sup>Telephone conversation with CDR Allen, JCS J-36 Staff, Washington DC, 7 May 1995.

<sup>12</sup>Naval Doctrine Command. Draft Navy Concept Paper for Theater Ballistic Missile Defense, p.10.

<sup>13</sup>Joint Chiefs of Staff, pp. II-6-7.

<sup>14</sup>Ibid., pp. II-6-7.

<sup>15</sup>Naval Doctrine Command, Composite Warfare Commander's Manual, NWP 10-1 (Rev A) (Norfolk VA: August 1993), p.10.

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<sup>16</sup>Naval Doctrine Command, Draft Navy Concept Paper for Theater Ballistic Missile Defense, p.17.

<sup>17</sup>The Joint Staff, p.57.

<sup>18</sup>United States European Command, Draft USEUCOM Concept for Operations. (Stuttgart GE, n.d.), p. 3.

<sup>19</sup>Ibid. p.6.

<sup>20</sup>Roger L. Berg, "Joint Ground Station Offers Real-Time Tactical Ballistic Missile Warnings." Signal, March 1995, pp. 40-41.

<sup>21</sup>Telephone conversation with CDR Semmler, Naval Doctrine Command, Norfolk VA, 7 May 1995. Naval Doctrine Command produced the Draft Overview of Integrated Battle Group C2 Concept. This document will be used to generate a TACMEMO which will be wargamed for validity. Eventually, it may replace NWP 10-1.

<sup>22</sup>Naval Doctrine Command. Draft Overview of an Integrated Battle Group C2 Concept (Norfolk VA: February 1995), pp. 6-8.

<sup>23</sup>1K deGraffenreid, Kenneth E. and Patrick J. Bush. "Naval Theater Defense in Support of Regional Security and Non-proliferation," in Theater Missile Defense: Systems and Issues - 1993 A collection of papers presented at the Sixth International Conference on TMD Systems and Capabilities, April 1993, ed. David Israel, (Washington DC: American Institute of Aeronautics and Astronautics, 1993), p.254.

<sup>24</sup>Ibid., pp. 263-264.

<sup>25</sup>Patrick J. Bush, "Navy Theater Missile Defense Gains Impetus." National Defense, March 1994, p. 40.

<sup>26</sup>The Joint Staff, p. 20.

<sup>27</sup>Glenn W. Goodman, Jr. "Zapping the Sea Skimmers." Armed Forces Journal, April 1995, p. 28.

<sup>28</sup>United States European Command, Draft USEUCOM Concept for Operations (Stuttgart GE: n.d. p.6.

<sup>29</sup>James Wheeler, Final Report Theater Missile Defense Support, Operation African Eagle (San Diego: JAYCOR, 24 March 1995), p.6.

<sup>30</sup>Ibid., p.10.

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<sup>31</sup>Ballistic Missile Defense Organization, Department of Defense, 1993 Report to Congress on the Theater Missile Defense Initiative (TMDI). Washington DC: 1993. pp.4-7.

<sup>32</sup>James Wheeler, p.11.

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|-----------|--|
| CRC       | Control and Reporting Center                               |
| CWC       | Combined Warfare Commander                                 |
| DSP       | Defense Support Program                                    |
| EADSIM    | Extended Air Defense Simulation                            |
| FAAWC     | Fleet Antiair Warfare Commander                            |
| GALE      | Generic Area Limitation Environment                        |
| GENSER    | General Service (not Special Intelligence)                 |
| ICC       | Interface Control Central                                  |
| JAOC      | Joint Air Operations Center                                |
| JCS       | Joint Chiefs of Staff                                      |
| JDISS     | Joint Deployable Intelligence System                       |
| JFACC     | Joint Force Air Component Commander                        |
| JFC       | Joint Force Commander                                      |
| JIC       | Joint Intelligence Center                                  |
| JMCIS     | Joint Military Command Information System                  |
| JOC       | Joint Operations Center                                    |
| JTAGS     | Joint Tactical Ground Station                              |
| JTCB      | Joint Target Coordination Board                            |
| JTF       | Joint Task Force   |
| JTIDS     | Joint Tactical Information Distribution System             |
| JTMD      | Joint Theater Missile Defense                              |
| LFC       | Landing Force Commander                                    |
| MAGTF COC | Marine Air-Ground Task Force Combined Operations<br>Center |
| MARFOR    | Marine Forces  |
| MCC       | Maritime Component Commander                               |

|           |   |
|-----------|---|
| NAVFOR    | Naval Forces  |
| NBC       | Nuclear, Biological, and Chemical                   |
| OTC       | Officer in Tactical Command                         |
| OTCIXS    | OTC Information Exchange System                     |
| PADL      | Patriot Data Link                                   |
| SADC      | Sector Air Defense Coordinator                      |
| SAAWC     | Sector Antiair Warfare Commander                    |
| SCC       | Sea Combat Coordinator                              |
| SEWC      | Space and Electronic Warfare Commander              |
| SOFOR     | Special Operations Forces                           |
| STWC      | Strike Warfare Commander                            |
| SUBOPAUTH | Submarine Operating Authority                       |
| TAAD COM  | Theater Area Air Defense Command                    |
| TACC      | Tactical Air Control Center                         |
| TAD       | Theater Air Defense                                 |
| TBM       | Theater Ballistic Missile                           |
| TBMD      | Theater Ballistic Missile Defense                   |
| TDDS      | Navy Tactical Data Distribution System              |
| THAAD     | Theater High Altitude Area Defense                  |
| TIBS      | Tactical Information Broadcast Service              |
| TM        | Theater Missile                                     |
| TMD       | Theater Missile Defense                             |
| TOC       | Tactical Operations Center                          |
| TRAP      | Tactical Related Equipment and Related Applications |
| USEUCOM   | United States European Command                      |